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ABSTRACT

The present paper reports on results generated by an unconventional application of the testing paradigm. This application was made necessary by the nature of several goals of Project PLAN in the area of student personal and social behavior, self-planning skills for occupational and personal development, etc. Attainment of such goals is very difficult to measure using standardized testing procedures. The critical incident technique was utilized to identify important aspects of student behavior which were felt to represent positive exemplars of these goals. From this basis, student self-report procedures were developed. These procedures were applied to situations which were structured according to cues obtained from the original critical incidents. The weight of the findings supports the tentative conclusion that PLAN students are making good progress. However, the study cannot be considered definitive because of certain limitations. A critical incident report form (teacher completed), the teacher's directions for the independent learning and community service activities exercises, the criteria for tabulating responses to these exercises, and a list of the school classes forming the sample are appended. (Author/LE)

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EVALUATIVE USES OF UNCONVENTIONAL MEASUREMENT  
TECHNIQUES IN AN EDUCATIONAL SYSTEM

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ABSTRACT

The present paper reports on results generated by an unconventional application of the testing paradigm. This application was made necessary by the nature of several goals of PLAN in the area of student personal and social behavior, self-planning skills for occupational and personal development, etc. Attainment of such goals is very difficult to measure using standardized testing procedures. The critical incident technique was utilized to identify important aspects of student behavior which were felt to represent positive exemplars of these goals. From this basis, student self-report procedures were developed. These procedures were applied to situations which were structured according to cues obtained from the original critical incidents. The results indicated the degree to which the goals had been obtained, both in an absolute sense and in comparison with the results of a more conventional educational program.



## EVALUATIVE USES OF UNCONVENTIONAL MEASUREMENT TECHNIQUES IN AN EDUCATIONAL SYSTEM

During the late Fall of 1969, persistent rumors circulated through the Project PLAN headquarters in Palo Alto. The essence of these rumors, emanating from classrooms in which instruction had been individualized through the use of this educational system, suggested that students were making progress toward some of PLAN's most important educational goals. The mission, which we decided to accept, was to gather some hard data regarding these rumors.

Individualized education is thought to have a salutary effect on learners which goes beyond the immediate acquisition of facts and skills (Bolvin and Glaser, 1968; Flanagan, 1970). These effects usually are referenced in non-operationalized terms such as self-management, self-responsibility initiative, resourcefulness, etc. They are generally thought to come about as a result of the individualized system, in which the student is allowed to utilize a certain amount of self-direction acquired perhaps through the nature of the instruction or through peer modeling. The successful experiences generated by these attempts at self-direction are presumed to reinforce and maintain such characteristics.

Project PLAN is not unlike other individualized educational systems in this regard. Three relevant PLAN goals for participating students are as follows:

- (1) PLAN will assist students to take responsibility for their individual development;
- (2) PLAN will assist students to plan, manage, and carry out their individual development; and
- (3) PLAN will assist students to acquire good patterns of social and civic behavior--leadership, initiative, integrity, resourcefulness.

Wright (1970) has presented a complete list of the goals for students in PLAN, stated at roughly the same level of specificity - which is to say that these are not "behavioral" objectives. They are, however, valid educational objectives, not unlike some of those posited by an early attempt to

define quality education (QUEPS, 1968).

Such goals are not of vital consequence, however, if (1) there is no possibility of structuring the educational experience so that they might be translated into some form of student behavior, and (2) if there is no way to discover this behavior and make it a matter of public record. It has already been noted above and mentioned in this symposium that PLAN has been designed to require student behaviors that can be classified as interim steps toward such goal attainment. The nature of the teacher training program, the guidance program, the instructional management system, and even the very structure of the teaching learning units (TLU's) themselves are designed to require participation of each student in the educational process.

These factors of educational system design are adequately covered elsewhere. The thrust of the present problem was to gather evidence that students in PLAN were progressing beyond the interim steps required by the educational system and were beginning to independently exhibit evidence that they were indeed self-directed. Teachers in PLAN schools were fond of saying that they could tell a PLAN student in the dark, or blindfolded, because the students were so self-directed. Thus, teachers were the first basic source tapped in attempting to empirically verify these claims.

#### METHOD

##### Critical Incident Study

The method of critical incidents (Flanagan, 1954) was utilized to collect from PLAN teachers observed events having special significance and relating to the areas of self-responsibility, self-management, and resourcefulness. Teachers were asked to think of a recent occasion when they observed a student exhibit an unusual degree of one of the above traits. They were then asked to recount the circumstances surrounding the event and to tell exactly what the student did that indicated growth and development with respect to these qualities. Finally, they were asked to indicate why they thought the incident was a result of the student's experience in PLAN.

To collect these data, Critical Incident forms (appendix A) were sent to all PLAN teachers (N=374) along with stamped return envelopes. In all, 56 incidents were returned to AIR in Palo Alto. These were analyzed and reduced to the following six statements which best summarize the incidents reported:

- (1) started assigned tasks promptly without reminder

- (2) did unusually thorough job on assigned task or continued beyond requirements of assigned or agreed-upon task
- (3) used AV media or books more than required by assigned or agreed-upon task
- (4) carried out unassigned learning task without reminder or support from others
- (5) completed an unassigned civic, social, or playground activity without reminder or support from others
- (6) planned and completed a strategy or a schedule involving several tasks

In general, the behaviors reported here were cases where students carried through on a task or project on their own, with no prodding or reminder. The motivation was presumably intrinsic, ie., the student was motivated to perform to please his own interests, to achieve his own satisfactions, rather than to satisfy the requirements imposed by teacher, parent, or other authority persons.

The next step was to obtain hard data on the extent to which PLAN students in general exhibited such behaviors in comparison with students who were enrolled in more conventional educational programs.

#### Community Problems Exercise

Within the time constraints imposed by the rapidly approaching end of the school year, it was obvious that no massive collection of observations in either a natural or a contrived setting was possible. It was decided that a student self-report type of exercise was the only practical alternative. Such data have proven to have considerable accuracy when the student is asked to respond to questions about public events for which some sort of independent verification is possible (Flanagan and Jung, 1970), and they have the advantage of being comparatively easy to collect. Forms were therefore prepared for grade levels 5,6,7,9,10 and 11 (PLAN for grade levels 8 and 12 will not be ready for tryout in the schools until this year).

The forms contained spaces for students to report two types of activities which it was thought would relate to the critical incidents reported previously. These were (1) Independent Learning Activities, including those relating to general educational development but not part of the assigned schoolwork; and (2) Community Service Activities, including things related to the improvement of the community. Students were asked to report only activities they had performed during the course of the last semester, in order to delimit the reporting period and try to keep it within their memory capacity. They

were also asked to indicate their role in the organization and planning of these activities. Each form contained the following basic instructions:

List the activities in which you have participated in the past semester. These should be activities which were undertaken voluntarily by you. For each activity you list, you should indicate your role in the organizing and planning of the activity. Use the back of this page if necessary.

The teacher instructions, part of which were to be read to the class, are included as Appendix B. These instructions attempted to: (1) provide enough information to teachers about the purpose of the study to gain their cooperation; and (2) to standardize the conditions of administration such that results would be comparable across classes. As will be noted later, only partial success was achieved in this effort. The instructions indicated that the students should not be given teacher-constructed examples which would influence the responses of the class as a whole, since spontaneous and thoughtful replies were of most interest. However, it was realized that fifth and sixth grade students especially might have difficulty in grasping the concepts involved in "independent learning" and "community service" activities. Therefore, several examples were given which were taken directly from the reported critical incidents. Allowance was then made in the scoring for responses which were obviously just repetitions of these examples.

Materials were sent to the PLAN and control classes via PLAN consultants about May 7. Control classes had been selected at the outset of PLAN to serve in comparisons such as the present one. In general, these consisted of non-PLAN classes in the same school or of classes in neighboring PLAN schools judged to exhibit a similar student population. While strict random assignment of subjects to classes was not achieved, it is felt that the situation was the best that could have been obtained under the circumstances of such a large developmental undertaking as PLAN. Exercises were returned from 54 classes, of which 37 were PLAN and 17 were control.

#### RESULTS

The number of Independent Learning activities and Community Service activities were tabulated for each respondent (N=1400) according to the criteria presented in Appendix C. In general these criteria were designed to insure, to as great an extent as possible, that tabulated activities were: (1) learning and community service related; (2) independently undertaken; and (3) not the result of some idea implanted solely as a result of the directions or other instructions by the teacher.

In order to check the adequacy of these criteria for achieving reliability in tabulating activities, two persons independently tabulated a randomly selected sample of six classes. Table I demonstrates the high level of agreement which was achieved.

(Insert Table I here)

In order to generate meaningful comparisons in terms of the tabulations of these data, only PLAN data were selected for further analysis for which appropriate control data also existed. This meant that all analyses were made by comparing the data generated by students in PLAN classes with data generated by students in other classes in the same school or in a neighboring school. This resulted in the selection of 14 (7 PLAN, 7 control) classes at the 5th grade level (PLAN N=231, control N=182), 8 (4 PLAN, 4 control) classes at the 6th grade level (PLAN N=110, control N=122), 2 (one of each) classes at the 7th grade level (PLAN N=24, control N=31), and 4 (two of each) classes at the 9th grade level (PLAN N=60, control N=52). These classes and their location are indicated in Appendix D.

The results of the basic tabulations of data by designated category and by grade level are presented in Table II.

(Insert Table II here)

The total tabulations, corrected on a percentage basis for differences in the N's, are presented in Table III.

(Insert Table III here)

In order to attribute a probability statement to the differences which are apparent in these tables, Mann-Whitney U tests were performed using the ranked frequencies of both Independent Learning and Community Service activities for each grade level. The results of these analyses are presented in Table IV.

(Insert Table IV here)

The differences at grades 5 and 6 were significant and in favor of the PLAN classes.

#### DISCUSSION

The present study cannot be considered definitive for several reasons; however the weight of the findings supports the tentative conclusion that PLAN students are indeed making good progress toward the attainment of some of the most important objectives of any educational program. Further, these data were collected in a relatively short period of time with a minimum of expense, pointing

out an innovative application of the critical incident technique in evaluating a comprehensive educational program.

The following limitations of the present study are pointed out as a cautionary note against overgeneralizing from the results. First, it is realized that the limited percent of return for the community problems exercises implies a selected sample. The fact that over twice as many PLAN as control teachers returned exercises is also an indication of this selection. The class matching procedures were adopted in an attempt to reduce this source of error. Second, the responses from some classes strongly implied that students had been given instructions which went beyond those which were to have been read. The scoring procedures that were used attempted to reduce this error. In order to correct both of these drawbacks, however, much more control over the testing situation and much more time for following up on non-respondents would be required than was available in the present study.

To the extent that PLAN and control students were not chosen by random selection procedures, the results of the non-parametric statistical analysis are in question. At present, there is no way to estimate the effects of this deficit.

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TABLE I

Data on Reliability Check for Tabulating  
Independent Learning and Community Service Activities

|                      | PLAN Classes<br>(N=3) |         | Control Classes<br>(N=3) |         |
|----------------------|-----------------------|---------|--------------------------|---------|
|                      | Rater 1               | Rater 2 | Rater 1                  | Rater 2 |
| Independent Learning | 70                    | 63      | 29                       | 28      |
| Community Services   | 120                   | 117     | 77                       | 66      |

TABLE II

Comparison of Responses Between  
PLAN and Control Classes by Category

| Activity Categories                        | Grade Level |        |       |       |         |        |       |       |
|--------------------------------------------|-------------|--------|-------|-------|---------|--------|-------|-------|
|                                            | 5           | 6      | 7     | 9     | 5       | 6      | 7     | 9     |
|                                            | P C         | P C    | P C   | P C   | P C     | P C    | P C   | P C   |
| (1) Extra non-required reading             | 23 16       | 11 8   | 3 0   | 8 6   | 23 16   | 11 8   | 3 0   | 8 6   |
| (2) Research - library, tapes, etc.        | 16 7        | 7 6    | 2 0   | 6 2   | 16 7    | 7 6    | 2 0   | 6 2   |
| (3) Knowledge of needing or desiring info. | 5 2         | 4 9    | 2 0   | 5 2   | 5 2     | 4 9    | 2 0   | 5 2   |
| (4) Planned activity (or had major role)   | 15 2        | 6 5    | 3 1   | 17 2  | 15 2    | 6 5    | 3 1   | 17 2  |
| (5) Won prize in academic contest          | 6 0         | 1 0    | 0 0   | 1 0   | 6 0     | 1 0    | 0 0   | 1 0   |
| (6) Academic clubs                         | 2 2         | 4 10   | 3 0   | 5 9   | 2 2     | 4 10   | 3 0   | 5 9   |
| (7) Summer school                          | 2 1         | 12 0   | 0 0   | 0 0   | 2 1     | 12 0   | 0 0   | 0 0   |
| (8) Projects                               | 29 12       | 26 6   | 3 1   | 3 3   | 29 12   | 26 6   | 3 1   | 3 3   |
| Totals                                     | 98 42       | 71 44  | 16 2  | 45 24 | 98 42   | 71 44  | 16 2  | 45 24 |
|                                            |             |        |       |       |         |        |       |       |
| (1) Organized activities                   | 73 53       | 41 32  | 7 6   | 23 19 | 73 53   | 41 32  | 7 6   | 23 19 |
| (2) Service activities - own initiative    | 92 59       | 38 34  | 7 5   | 29 13 | 92 59   | 38 34  | 7 5   | 29 13 |
| (3) Helped someone                         | 48 19       | 6 1    | 4 4   | 1 1   | 48 19   | 6 1    | 4 4   | 1 1   |
| (4) Specific responsible position          | 26 8        | 26 16  | 3 1   | 7 6   | 26 8    | 26 16  | 3 1   | 7 6   |
| Totals                                     | 239 139     | 111 83 | 21 16 | 60 39 | 239 139 | 111 83 | 21 16 | 60 39 |

Independent Learning

Community Service

TABLE III

Comparison of Total Responses Between  
PLAN and Control Classes  
(Frequencies corrected for differences in N)

|                      | PLAN  | Control |
|----------------------|-------|---------|
|                      | N=231 | N=182   |
| Independent Learning | 98    | 51      |
| Community Service    | 239   | 168     |

|                      | Grade 6 |       |
|----------------------|---------|-------|
|                      | N=110   | N=122 |
| Independent Learning | 72      | 44    |
| Community Service    | 113     | 83    |

|                      | Grade 7 |      |
|----------------------|---------|------|
|                      | N=24    | N=31 |
| Independent Learning | 20      | 2    |
| Community Service    | 26      | 16   |

|                      | Grade 9 |      |
|----------------------|---------|------|
|                      | N=60    | N=52 |
| Independent Learning | 45      | 27   |
| Community Service    | 60      | 44   |

TABLE IV

Results of Mann-Whitney U Analysis<sup>1</sup>  
for Ranked Frequencies of Independent  
Learning and Community Service Activities

|         | <u>IL</u> |          | <u>CS</u> |          |
|---------|-----------|----------|-----------|----------|
|         | <u>U</u>  | <u>z</u> | <u>U</u>  | <u>z</u> |
| Grade 5 | 17,518    | -2.97*   | 17,707    | -2.82*   |
| Grade 6 | 5120      | 3.49*    | 5251      | 3.24*    |
| Grade 7 | 283       | 1.50     | 318       | .91      |
| Grade 9 | 1248      | -1.82    | 1361      | -1.16    |

\*  $p < .05$ , 2 tailed test

<sup>1</sup> correction for ties omitted

APPENDIX A

Think of a recent occasion when you observed a student exhibit an unusual amount of some quality such as resourcefulness, independence, initiative, self-confidence, responsibility, social sensitivity, etc., which appeared to result from the PLAN approach to education.

In what grade was the student? \_\_\_\_\_

Was the student male or female? (circle one)

When and where did the incident occur?

Just what did the student do that indicated desirable growth and development with respect to such qualities as those mentioned above?

Why do you believe this incident is a result of the student's educational experience in PLAN?

## APPENDIX B

### Teacher's Guide

#### Community Problems Exercise

##### General Information

American Institutes for Research is conducting this survey for the purpose of examining the degree of awareness and involvement of American students. We are particularly interested in their skills in identifying problems and in formulating and carrying out plans of action in areas which are of interest to them. A selected sample of schools around the nation is participating in this survey. We hope that it will be possible for you to take about 45 minutes to implement the survey in your class and to return it to us. The results will be returned to you as soon as they can be prepared.

##### Instructions

To administer the exercise, read the following paragraph:

"Today you are asked to take a few minutes to participate in a survey designed to examine the current degree of involvement of American students in community problems. This class has been chosen to be representative of many students in this area at this grade level. The results of this survey will be examined as an indication of the activities and concerns of students around the country. We ask, therefore, that you be frank and thorough in responding to the following exercise."

Pass out one "Community Problems Exercise" booklet to each student. Ask the students to print their name, school, and your name at the top of the booklet in the spaces indicated. Then say the following:

"On the first page of the booklet, marked 'Activities List,' you are asked to list some of the independent activities on which you have worked in the past semester. This includes those which deal with community service, improvement of social relationships in or outside of school, exercise of your civic responsibilities, etc. These should generally be activities which

were undertaken voluntarily by you, rather than assigned. For each activity which you list, you should indicate your role in its organization and planning. Under the heading 'Independent Learning activities,' list things you have done in the past semester that are related to your general development and education, but were not part of your assigned schoolwork. This might be a science fair project or simply a book you have read which is of interest to you. Under the heading 'Community Service activities,' list things you have done in the past semester for the improvement of your community. This would include such things as starting or helping with a charity drive in your school or hometown, writing a letter to the editor of your local paper, or similar activity. Try to remember and to list those things you have done this past semester and tell whether you planned, organized, or participated in each."

Allow enough time for all students to finish; then ask them to turn to the "Community Problem" on page 3. Read the directions which are printed at the top of the page. You should then allow exactly 30 minutes for the students to complete the exercise. You may rephrase or amplify the exercise question if you feel this is necessary, but refrain from offering examples which might influence the responses of the entire class. We are interested in spontaneous and thoughtful replies. If some students need more space for their responses than is provided on the booklet, provide them with scratch paper and staple it to the back of the booklet.

When 30 minutes have expired, gather all returned problems exercise booklets (one from each student) and return them to the local coordinator.

Address any questions or comments to:

Dr. Steven M. Jung  
American Institutes for Research  
P.O. Box 1113  
Palo Alto, California 94302

## APPENDIX C

### Criteria for Response Tabulation by Category

#### Independent Learning Activities

- (1) Extra non-required reading or studying  
Scored only when child indicated that he did extra credit reading for a purpose; ie., interest in a subject, extra credit book reports, enlarge vocabulary. Statement that "I read books" not adequate; must show that child took the initiative in activity for educational purpose.
- (2) Research - library, tapes, audio-visual  
Scored when child stated that he sought information on his own - either for personal interest or for assignment - but must indicate that source used was thought of by child, not assigned or suggested. Includes use of library, encyclopedias, reference books, tapes, A-V material. Also includes personal educational "field trips" to study plants, animals, etc.
- (3) Knowledge of needing and/or desiring information  
Scored responses when child actively sought help with schoolwork or desired information about a subject of interest to him. Includes activities such as attending lectures, group meetings, writing letters (to persons, organizations) to obtain information.
- (4) Planned or had major role in an activity  
Scored only when child indicated having organized (or played major role) in such activities as a play, panel discussion, club, bulletin board, etc. Also included roles as yearbook, newspaper editor, active student government member, etc.
- (5) Won prize in contest related to learning  
Science fairs, art; music contests, etc. (Self-explanatory)
- (6) Voluntary membership in academic organizations  
Science club, language clubs, etc. Does not include band, choir, cheerleading, etc. (Self-explanatory)
- (7) Voluntary summer school (Self-explanatory)
- (8) Projects  
Scored when child indicated that he initiated or was involved in extra-curricular, voluntary project. Included those undertaken completely by own self (raising animals, conducting an experiment) and submitting a project for an organized program.

#### Community Service Activities

- (1) Organized community service activities  
Scored when child indicated voluntary participation in a community service activity sponsored or promoted by a group or organization. The activity mentioned must be specific (membership not adequate) and includes church, scouts and fund-raising projects as well as safety patrol, organized tutoring, etc.

(2) Service activity undertaken by self

Scored when child listed a service activity performed on his own, outside the sphere of groups to which he belonged. Examples of this behavior are picking up trash, paper, etc., performing charitable services (ie., donations, visiting old and underprivileged groups) participating in political and other types of campaigns (passing out leaflets, taking surveys).

(3) Helped someone

Scored when specific incident of helping either another person or group was reported. This includes helping another child with homework, supervising younger children in play, helping older person with yardwork, chores. Incident must be one undertaken for the purpose of being of service, not performed because it was a regular duty or for reward or pay.

(4) Acted in specific responsible position

Includes responses indicating that child voluntarily held (and generally had earned) a unique position that was service oriented. Examples are audio-visual monitor, teacher's aide, leader roles in church activities and other projects.

Activities which were reported substantially in the same form by at least one-half of a class were considered to be teacher (or otherwise) implanted and were not tabulated.

## APPENDIX D

### Listing of Utilized Classes

|     | PLAN                                                     |      | CONTROL                                              |      |
|-----|----------------------------------------------------------|------|------------------------------------------------------|------|
| 5th | Tavennerville Elem<br>Wood County Schools, W.Va.         | N=38 | Fairplains (2 classes)<br>Wood County Schools, W.Va. | N=45 |
|     | Laurelwood Elem (2 classes)<br>Santa Clara Unified       | N=50 | Laurelwood Elem<br>Santa Clara Unified               | N=29 |
|     | Emerson Elem<br>Wood County Schools, W.Va.               | N=29 | Emerson Elem<br>Wood County Schools, W.Va.           | N=29 |
|     | Reed Elem<br>San Jose Unified                            | N=31 | Reed Elem<br>San Jose Unified                        | N=28 |
|     | Millard Elem<br>Fremont Unified                          | N=50 | Millard Elem<br>Fremont Unified                      | N=21 |
|     | Harrison Park Elem<br>Penn-Trafford District, Pa.        | N=33 | Trafford Elem<br>Penn-Trafford District, Pa.         | N=30 |
| 6th | Mirassou Elem<br>Union District, Los Gatos               | N=21 | Mirassou Elem<br>Union District, Los Gatos           | N=20 |
|     | Reed Elem<br>San Jose Unified                            | N=30 | Reed Elem<br>San Jose Unified                        | N=29 |
|     | Immaculate Heart of Mary<br>Archdiocese of San Francisco | N=30 | St. Charles<br>San Carlos                            | N=38 |
|     | Harrison Park Elem<br>Penn-Trafford District, Pa.        | N=29 | Trafford Elem<br>Penn-Trafford District, Pa.         | N=35 |
| 7th | John Muir<br>San Jose Unified                            | N=24 | St. Charles<br>San Carlos                            | N=31 |
| 9th | Penn High<br>Penn-Trafford, Pa.                          | N=30 | Trafford High<br>Penn-Trafford, Pa.                  | N=24 |
|     | Franklin Jr. High<br>Wood County, W.Va.                  | N=30 | Franklin Jr. High<br>Wood County, W.Va.              | N=28 |

Schools, unless otherwise noted, are in California.